Hydrology and
Earth System
Sciences

Open Access

EGU

Supplement of

Incorporating experimentally derived streamflow contributions into model parameterization to improve discharge prediction

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Supplemental Information

1 Performance measures used for evaluating the discharge simulations

1	Kling-Gupta efficiency KGE_Q (see 5, 6, 7 for definitions of α_Q, β_Q and r_Q)	$1 - \sqrt{\left(1 - \alpha_Q\right)^2 - \left(1 - \beta_Q\right)^2 - \left(1 - r_Q\right)^2}$
2	Nash-Sutcliffe efficiency NSE_Q (n: number of observations)	$1 - \dfrac{\sum_n (Q_{obs} - Q_{sim})^2}{\sum_n (Q_{obs} - \overline{Q_{obs}})^2}$
3	Logarithmic Nash-Sutcliffe efficiency $logNSE_Q$	$1 - \dfrac{\sum_n (\log Q_{obs} - \log Q_{sim})^2}{\sum_n (\log Q_{obs} - \log \overline{Q_{obs}})^2}$
4	Root Mean Squared Error $RMSE_Q$	$\sqrt{\dfrac{\sum_n (Q_{obs} - Q_{sim})^2}{n}}$
5	Bias of the simulated and observed discharges β_Q	$\dfrac{\overline{Q_{sim}}}{\overline{Q_{obs}}}$
6	Relative variability in the simulated and observed discharges α_Q (σ: standard deviation)	$\dfrac{\overline{\sigma_{sim}}}{\overline{\sigma_{obs}}}$
7	Linear correlation between simulated and observed discharges r_Q	linear correlation coefficient between Q_{sim} and Q_{obs}

2 Reduction of the 2,000,000 parameter sets using $KGE_Q \geq 0.5$, and F_{HS} and $F_{GW} \pm 20\%$
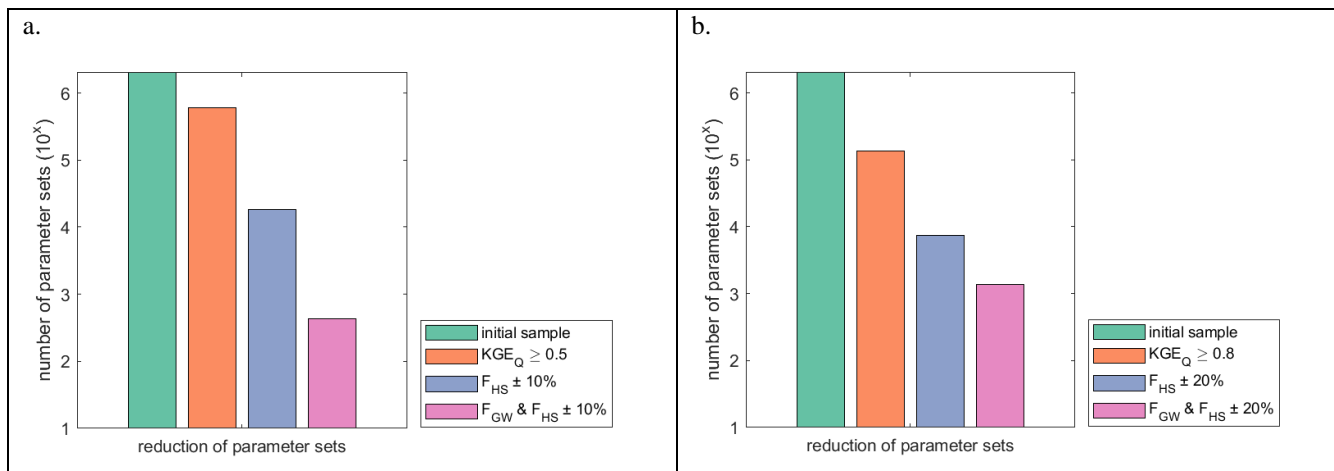

Figure S1: Iterative reduction of the initial sample of 2,00,000 parameter sets using the KGE_Q and hydrograph-separation derived streamflow contributions for the individual years 2013 and 2014, as well as for both years together. (a) Using a more relaxed threshold of $KGE_Q \geq 0.5$ (and F_{HS} and $F_{GW} \pm 10\%$), and (b) a more relaxed threshold of F_{HS} and $F_{GW} \pm 20\%$ (and $KGE_Q \geq 0.8$).

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3 Parameter distributions obtained by using KGE$_Q \geq 0.5$, and F_{HS} and $F_{GW} \pm 20\%$
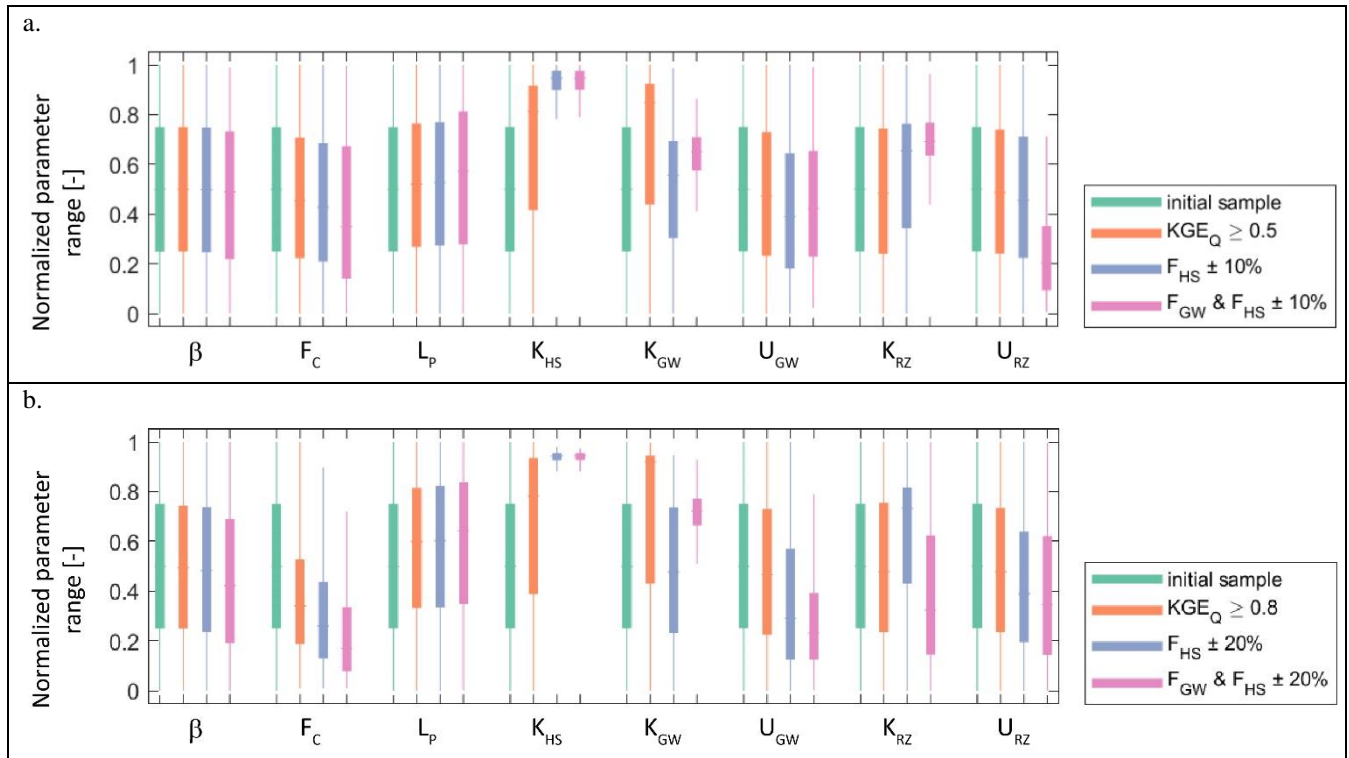

Figure S2: Initial parameter distribution and their modification along the three parameter estimation steps for the individual years 2013 and 2014, as well as for both years together. Boxes indicate the range between the 25th and 75th percentile, lower and upper whiskers show the 5th and 95th percentile, respectively. (a) Using a more relaxed threshold of KGE$_Q \geq 0.5$ (and F_{HS} and $F_{GW} \pm 10\%$), and (b) a more relaxed threshold of F_{HS} and $F_{GW} \pm 20\%$ (and KGE$_Q \geq 0.8$).